

# Wisconsin's Forest Resources



Acreage in timberland in Wisconsin is increasing and currently stands at over 16.8 million acres. These forests are becoming middle-aged with major increases in stands 60 to 100 years old. However, acreage in very young and very old stands has decreased in the last three decades. Most forestland is privately owned and located in northern and central parts of the state.

The volume of wood is increasing and is currently about 21.6 billion cubic feet. The species with the highest volume are red oaks, soft maple and hard maple. Growth rates are increasing at a greater pace than volume whereas mortality has increased at a much lower rate. Removals have remained static since 1996.

- [\*How have Wisconsin's forests changed?\*](#)  
Acreage by stand age class, forest type and size class
- [\*What are the major species and how have they changed?\*](#)  
Volume by major species: 1983, 1996, and 2012
- [\*Who owns our forests?\*](#)  
Timberland ownership by group
- [\*What types of forests do we have?\*](#)  
Acreage and map of timberland by forest type
- [\*How much wood do we have?\*](#)  
Growing stock volume: 1983, 1996, and 2012
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Average annual net growth: 1983, 1996, and 2012
- [\*How healthy are our forests?\*](#)  
Average annual mortality: 1983, 1996, and 2012
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Average annual removals: 1983, 1996, and 2012
- [\*How much biomass do our forests contain?\*](#)  
Short tons of aboveground biomass by species and year

## *"How have Wisconsin's forests changed?"*

### **Acreage by stand age class, forest type and size class**

There were over 16.7 million acres of [timberland](#) in Wisconsin in 2012. This is an increase of almost 2 million acres since 1983 and 1 million acres since 1996. Most of this increase has been in central and southeast Wisconsin.

About two-thirds of all timberland is classified as either maple- beech- birch, oak- hickory or aspen- birch [forest type](#) (Chart 1). Since 1996, the acreage in maple-beech-birch and aspen-birch has decreased and the number of acres in all other forest type classes has increased.

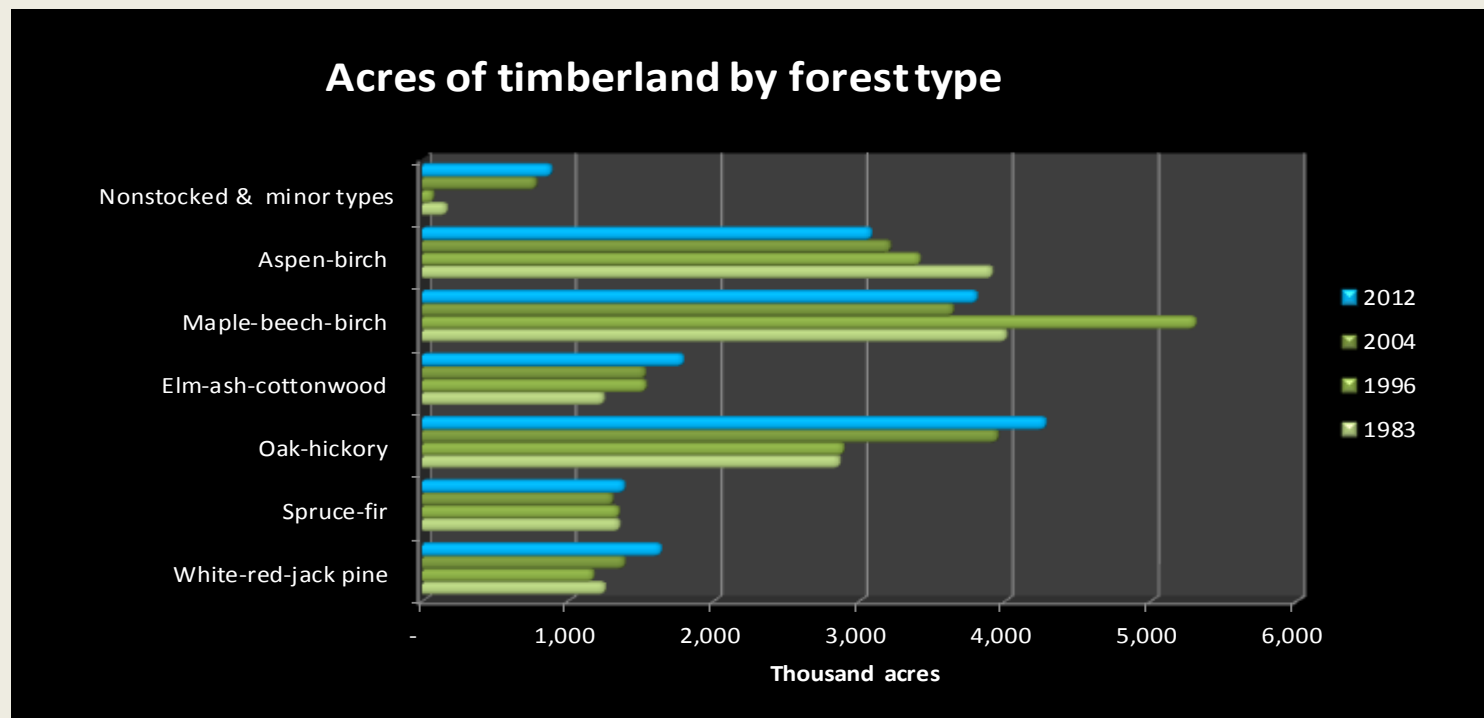


Chart 1. Acreage of timberland by forest type and inventory year (USDA Forest Service, Forest Inventory & Analysis 2012)

For a table of **Acreage of Timberland by Major Forest Type and County** go to:  
<http://dnr.wi.gov/topic/ForestBusinesses/documents/tables/AcreageForestType.pdf>

Wisconsin's forests are becoming **middle-aged** with fewer acres in the very youngest and very oldest age classes (Chart 2). In 1983, 22% of acreage was 20 years old or less. In 2012, this has decreased to only 13%. In addition, 7.7% of acreage was at least 100 years old in 1983. This age class represents only 3.9% of timberland in 2012.

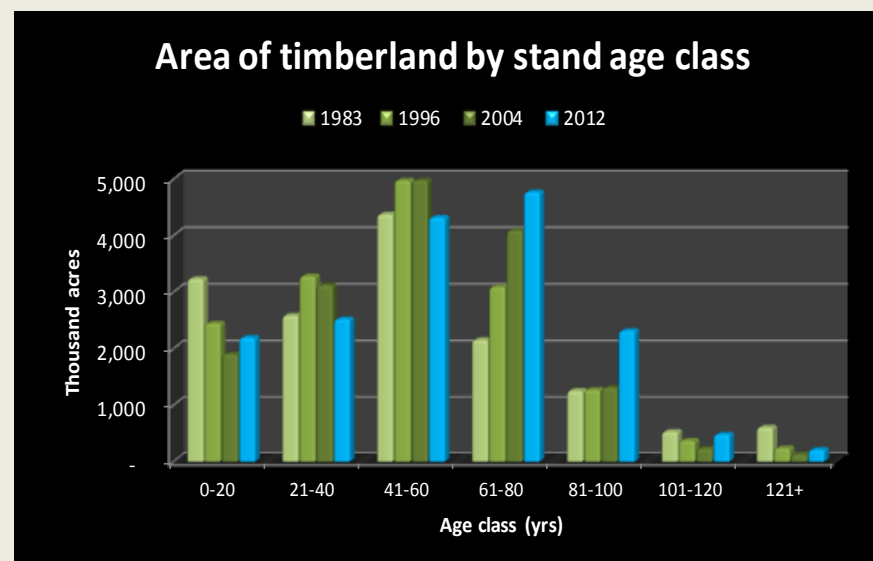


Chart 2. Acreage of timberland by stand age class and inventory year (USDA Forest Service, Forest Inventory & Analysis)

The distribution of acreage by [stand size class](#) reflects the same process of forest maturation (Chart 3). Between 1983 and 2012, the area in [sawtimber stands](#) increased by about 2.4 million acres or 55% whereas the acreage in [seedling/sapling](#) and [poletimber](#) stands decreased slightly.

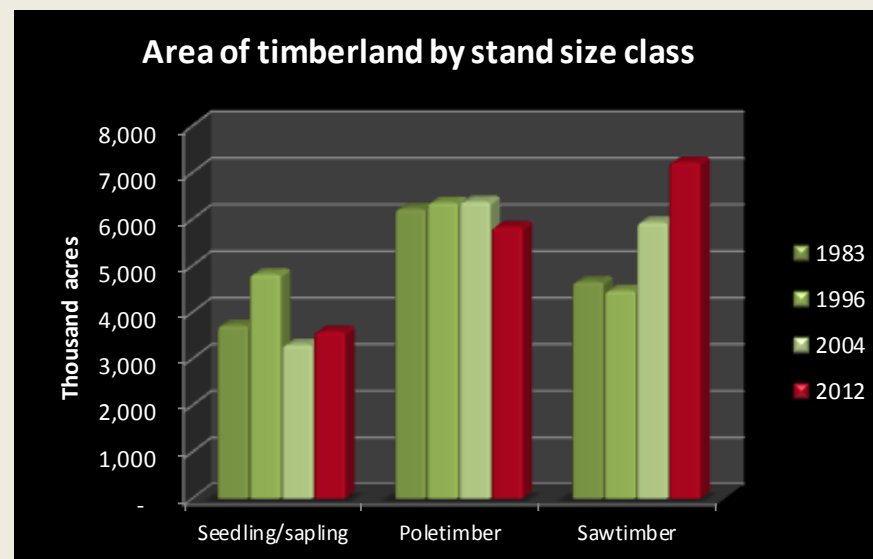


Chart 3. Acreage of timberland by stand size class and inventory year (USDA Forest Service, Forest Inventory & Analysis)

For tables of **Acreage of timberland by stand age class and county** or **Acreage of timberland by stand size class and county** go to:  
<http://dnr.wi.gov/topic/ForestBusinesses/publications.html>

## *"What are the major species and how have they changed?"*

### Growing stock volume by major species

There are 21.6 billion cubic feet of wood in Wisconsin's forests. The greatest volume of any major species in 2012 is in the **red oak group** (northern red oak, black oak, northern pin oak, Chart 4). Volume in this group has increased 31% since 1983. The second highest volume is in **soft maples** (red maple, silver maple) where volume has doubled in the last 28 years.

The greatest percentage **volume gains** in the last three decades have been in white pine (195%), red pine (116%), soft maple (104%), ash (88%), and the white oak group (65%, white oak, bur oak, swamp white oak).

The greatest percentage **volume losses** in the last three decades have been in jack pine (54%), paper birch (48%), balsam fir (26%), elm (22%) and aspen (12%).

The growing stock volume of elm species (American elm, slippery elm, rock elm, Siberian elm) decreased between 1983 and 1996, but has increased 26% since 1996.

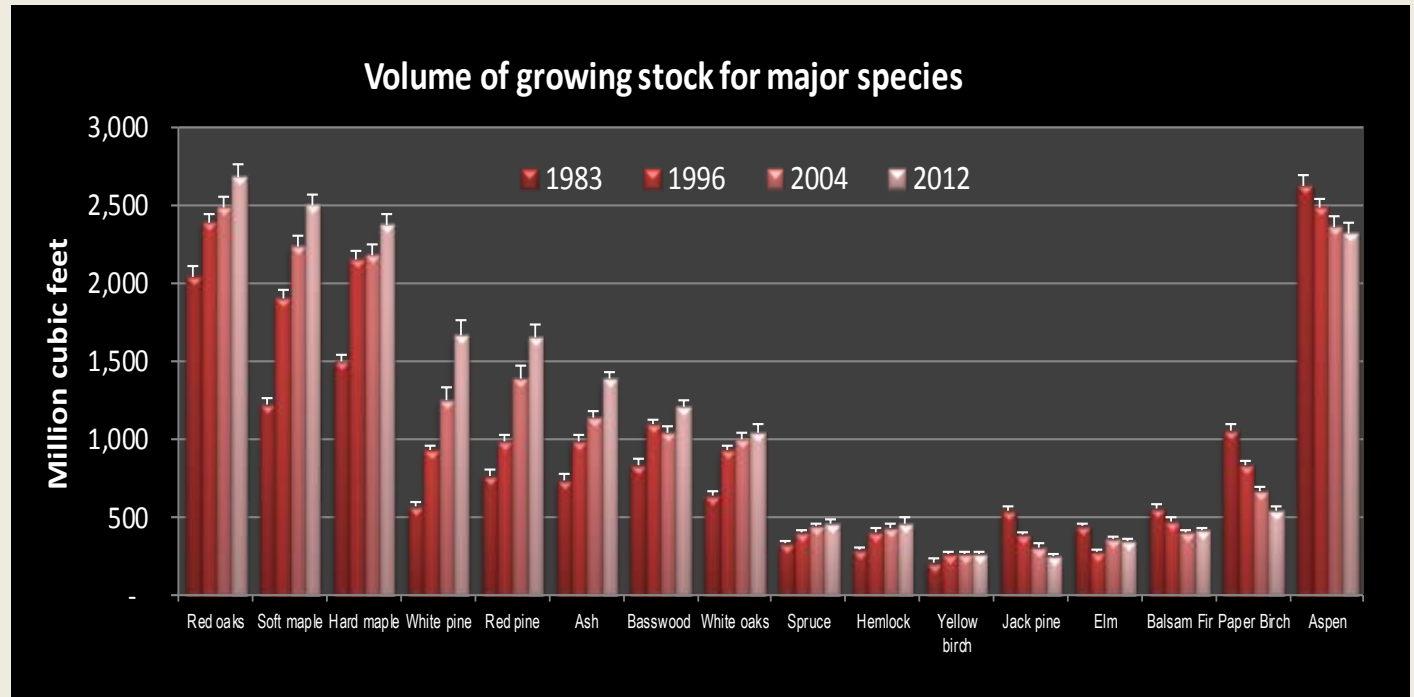


Chart 4. Volume of growing stock (million cubic feet) by species and inventory year (USDA Forest Service, Forest Inventory & Analysis 1983, 1996 and 2012).



## *"Who owns Wisconsin's forests?"*

### Timberland ownership by group

About **one third of Wisconsin's timberland is owned by the public**: federal, state, county, and municipal governments (Chart 5). Over half is owned by private individuals and 10% by corporate and other private entities.

### Acreage of timberland by owner group

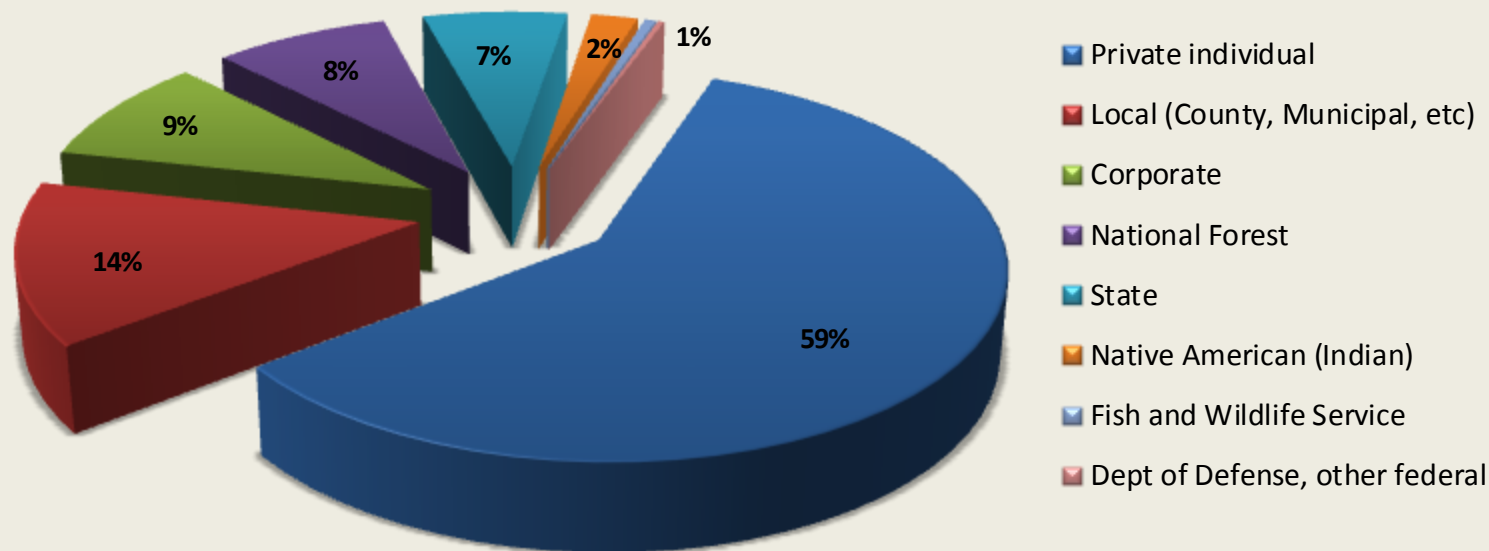


Chart 5. Acreage of timberland by owner group (USDA Forest Service, Forest Inventory & Analysis, 2012 data)

For a table of **Acreage of timberland by owner class and county** go to:

<http://dnr.wi.gov/topic/ForestBusinesses/documents/tables/AcreageOwnerCounty.pdf>



## *"What types of forests do we have?"*

### **Acreage and map of Wisconsin's timberland by forest type**

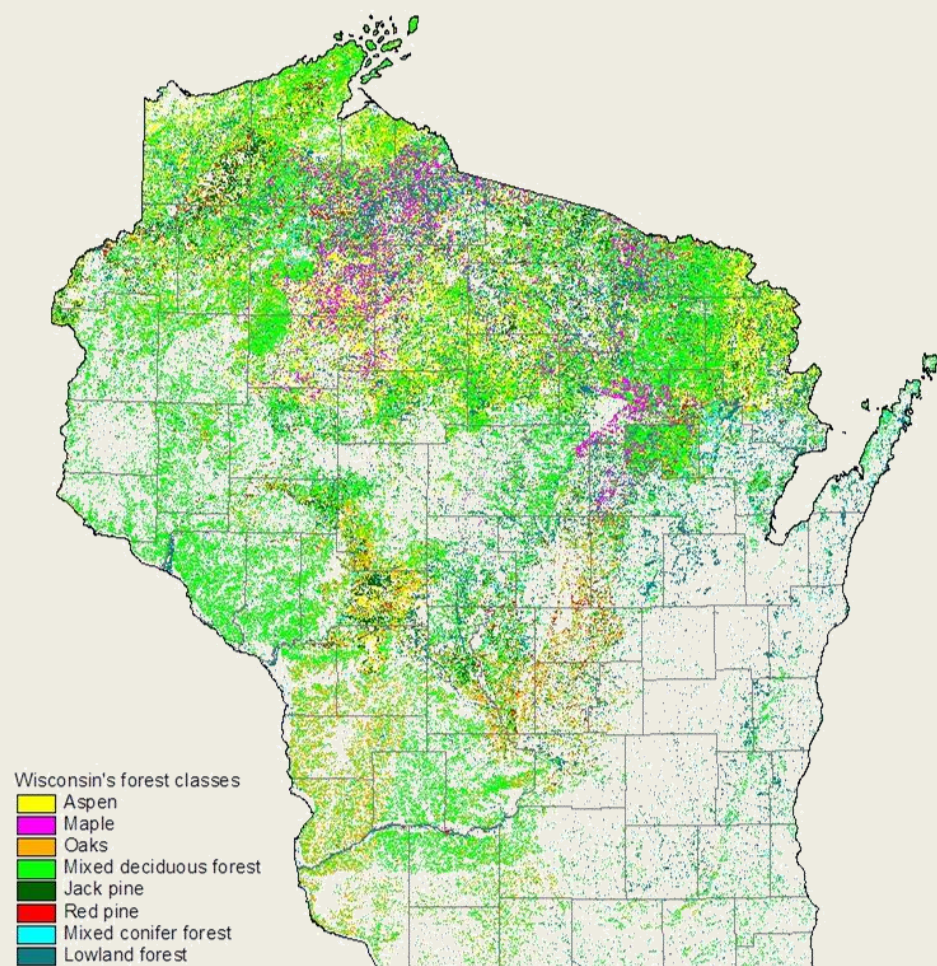
Wisconsin's forests are located mostly in the northern and central parts of the state (Table 1, map). Pine and oak-pine predominate in the sandy soils of central, northwest and northeast Wisconsin. Oak-hickory [forest type](#) occurs mostly in the southwest and central parts of the state. Aspen-birch, maple-basswood and spruce fir are primarily northern forest types. Bottomland hardwoods are distributed throughout the state in low-lying areas.

Table 1. Acres (1,000) of timberland by major forest type and region of the state

Forest type group	North east	North west	Central	South west	South east	Total
Oak-hickory	333	873	1,245	1,320	461	4,232
Maple basswood	1,355	1,532	347	317	193	3,744
Aspen-birch	1,006	1,503	384	132	83	3,108
Bottomland hardwoods	337	495	323	265	343	1,763
White, red, jack pine	470	429	564	73	54	1,590
Spruce fir	630	551	124	5	69	1,379
Oak-pine	151	147	243	30	29	601
Minor types*	65	67	78	44	56	309
<b>Total</b>	<b>4,347</b>	<b>5,597</b>	<b>3,308</b>	<b>2,187</b>	<b>1,287</b>	<b>16,726</b>

\* Includes nonstocked land, exotic hardwoods and exotic softwoods.

Source: USDA Forest Service, Forest Inventory & Analysis 2012 data



Source: WISLAND land cover, Wisconsin Dept. of Natural Resources, 1998



## *“How much wood do we have?”*

### Growing stock volume by species and year

Table 2. Growing stock volume in million cubic feet on timberland.

Species group	1983	1996	2012	Change since 1983
Red oaks	2,050	2,533	2,680	31%
Soft maple	1,221	1,976	2,494	104%
Aspen	2,628	2,520	2,324	-12%
Hard maple	1,494	2,234	2,367	58%
Red pine	766	1,024	1,646	116%
White pine	567	1,073	1,667	195%
Ash	738	1,021	1,386	88%
Basswood	836	1,117	1,204	44%
White oak	633	1,021	1,042	65%
Paper birch	1,053	845	540	-48%
Spruce	325	399	460	42%
Hemlock	284	439	459	61%
Balsam fir	556	479	410	-26%
Elm	435	284	339	-22%
Yellow birch	208	266	263	26%
Jack pine	526	389	246	-54%
Minor species	1,197	1,726	2,073	73%
<b>Total</b>	<b>15,515</b>	<b>19,345</b>	<b>21,600</b>	<b>39%</b>

Source: USDA Forest Service, Forest Inventory & Analysis

Wisconsin has 21.6 billion cubic feet of [growing stock volume](#) in trees over 5 inches in diameter, an increase of 39% since 1983 (Chart 6). The volume of white pine has almost tripled and the volume of soft maple and red pine has doubled since 1983. Ash, white oaks, hemlock and hard maple volume has also increased by over 50%.

Of all species, jack pine and paper birch have undergone the largest decrease in volume in the last two decades (Table 2). Balsam fir, elm and aspen also have shown declines.

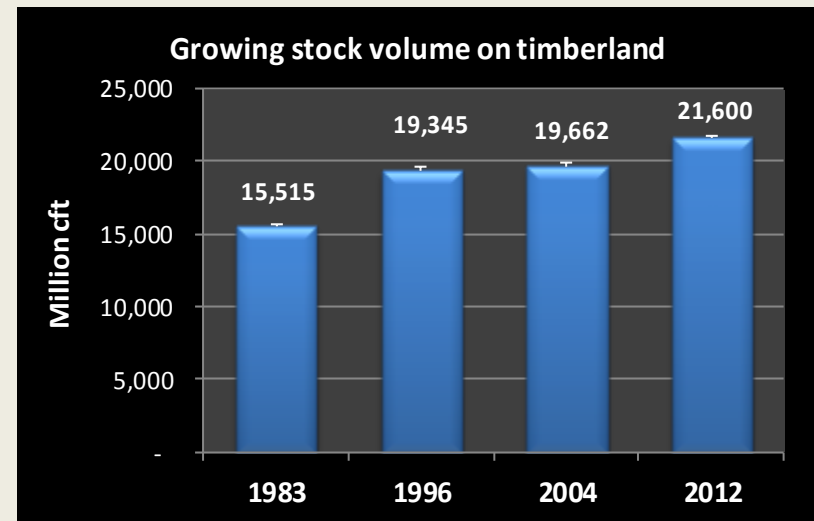


Chart 6. Volume of growing stock (million cubic feet) by inventory year (USDA Forest Service, Forest Inventory & Analysis).

## *"How fast are our forests growing?"*

### Average annual net growth by species and year

[Average annual net growth](#) has increased about 14% since 1983 (Chart 7). The average ratio of growth to volume is 2.6% statewide but some species surpass this.

Red pine, white pine, ash, aspen, hard maple and soft maple all have ratios over 2.5%. Paper birch, yellow birch, balsam fir, elm, white oaks and hemlock have growth ratios far below average. High mortality will decrease net growth significantly as is the case with aspen, elm, paper birch and balsam fir.

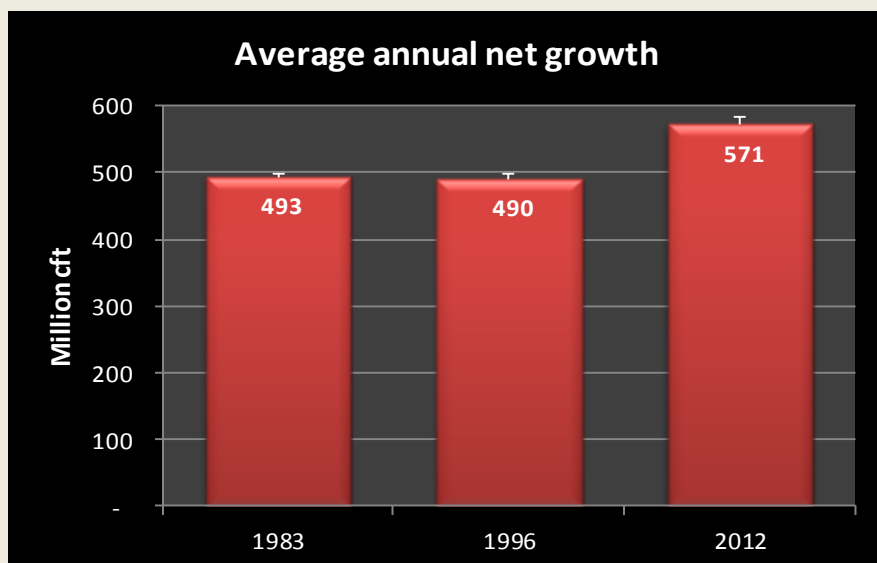


Chart 7. Average annual net growth of growing stock by inventory year (USDA Forest Service, Forest Inventory & Analysis).

Table 3. Growing stock volume, net growth and the ratio of growth to volume by species.

Species group	Growing stock volume (million cft)	Average annual net growth (million cft)	Ratio of growth to volume
Red pine	1,646	71	4.3%
White pine	1,667	69	4.1%
Ash	1,386	42	3.0%
Soft maple	2,494	75	3.0%
Aspen	2,324	61	2.6%
Hard maple	2,367	61	2.6%
Jack pine	246	6	2.4%
Spruce	460	11	2.4%
Basswood	1,204	27	2.2%
Red oaks	2,680	58	2.2%
Hemlock	459	8	1.7%
Balsam Fir	410	7	1.7%
White oaks	1,042	18	1.7%
Yellow birch	263	3	1.0%
Elm	339	1	0.3%
Paper Birch	540	(7)	-1.3%
Minor species	2,073	60	2.9%
<b>Total</b>	<b>21,600</b>	<b>571</b>	<b>2.6%</b>

Source: USDA Forest Service, Forest Inventory & Analysis 2012 data



## *"How healthy are our forests?"*

### Average annual mortality by species and year

Table 4. Annual mortality and gross growth of growing stock (million cubic feet) and the ratio of mortality to growth by species.

Species group*	Annual mortality (million cft)	Annual gross growth (million cft)	Ratio of mortality to gross growth
Elm	23.9	25	95.9%
Paper Birch	22.4	29	76.8%
Balsam Fir	18.6	26	72.5%
Yellow birch	3.3	6	55.8%
Jack pine	7.0	13	54.0%
Aspen	67.1	128	52.6%
Spruce	6.9	18	38.0%
Red oaks	26.3	85	31.1%
White oaks	6.0	24	25.3%
Basswood	6.3	33	19.0%
Ash	7.1	49	14.5%
Hemlock	1.3	9	14.5%
Soft maple	9.9	85	11.6%
Hard maple	4.9	66	7.5%
White pine	3.4	72	4.8%
Red pine	3.2	75	4.2%
Other species	18.5	78	23.7%
<b>Total</b>	<b>236</b>	<b>820</b>	<b>28.8%</b>

Source: USDA Forest Service, Forest Inventory & Analysis 2012 data

Overall, [average annual mortality](#) has increased at a faster pace than volume since 1996. Volume increased 11.7% but mortality increased by 24.8% (Chart 8). Certain species have experienced elevated mortality, especially paper birch, elm, balsam fir, aspen, yellow birch and jack pine (Table 4).

The species with the lowest ratios of mortality to [gross growth](#) are red and white pine, hard and soft maple, ash, and hemlock.

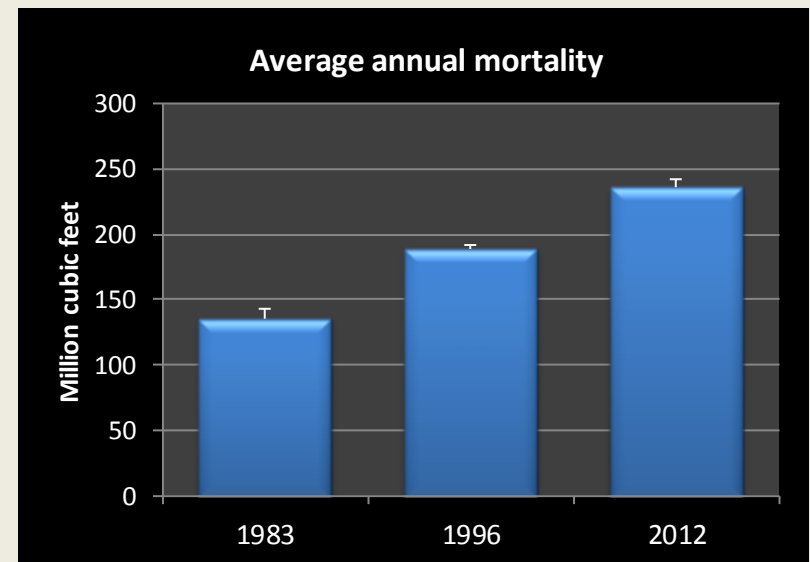


Chart 8. Average annual mortality by inventory year (USDA Forest Service, Forest Inventory & Analysis).



## *"How much wood do we harvest?"*

### Average annual removals by species and year

On average, we harvest 305 million cubic feet or 53% of net annual growth, down from 332 million cubic feet in 1996 (Chart 9). [Average annual removals](#) for paper birch, jack pine, aspen and yellow birch exceeded annual growth (Table 5). The species with the lowest harvest to growth ratios include hemlock, ash, and white pine.

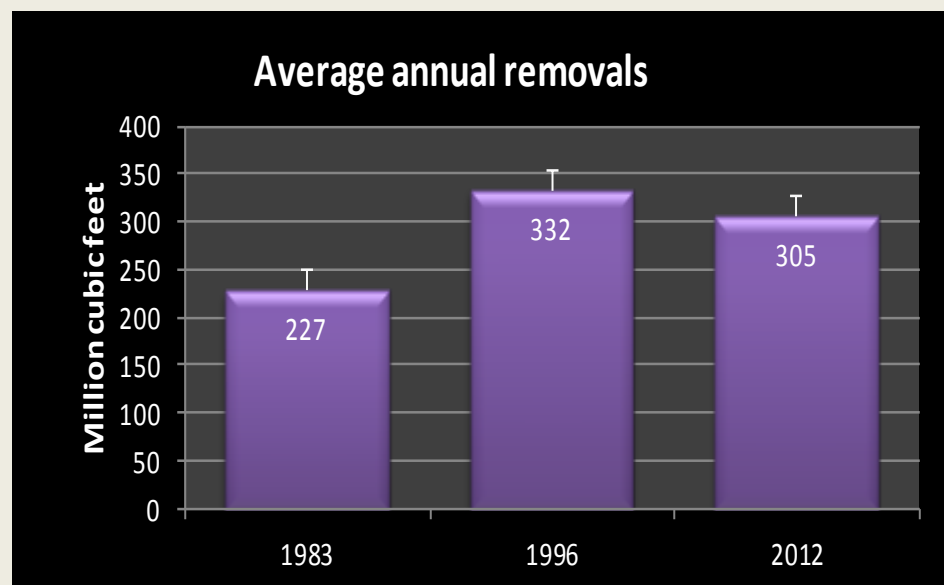


Chart9. Average annual removals (million cubic feet) of growing stock by inventory year (USDA Forest Service, Forest Inventory & Analysis).

Table 5. Average annual removals and annual net growth, and the ratio of removals to growth.

Species group	Annual removals (million cft)	Annual net growth (million cft)	Ratio of removals to growth
Elm	3.3	1.0	325%
Jack pine	12.7	6.0	212%
Aspen	71.0	60.5	117%
Yellow birch	3.0	2.6	116%
Balsam Fir	6.1	7.0	87%
Red oaks	39.6	58.4	68%
White oaks	10.0	17.6	57%
Red pine	34.5	71.4	48%
Hard maple	26.5	61.2	43%
Soft maple	31.6	75.0	42%
Spruce	4.5	11.2	40%
Basswood	10.7	26.9	40%
Ash	10.8	42.0	26%
Hemlock	1.7	8.0	22%
White pine	9.4	68.7	14%
Paper Birch	12.6	-6.8	-
Minor species	16.6	59.8	28%
<b>Grand Total</b>	<b>305</b>	<b>571</b>	<b>53%</b>

Source: USDA Forest Service, Forest Inventory & Analysis, 2012 data

## *"How much biomass do our forests contain?"*

### Short tons of aboveground biomass by species and year

Table 6. Aboveground biomass (million short tons) of tree species by year.

Species group	1983	1996	2012
Ash	22.8	30.8	44.0
Aspen	60.8	60.6	57.2
Balsam Fir	11.3	10.3	11.1
Basswood	15.2	19.0	21.4
Elm	12.9	9.8	12.8
Hard maple	59.2	77.1	82.6
Hemlock	5.5	7.8	9.7
Jack pine	11.7	8.1	5.9
Paper Birch	34.1	25.6	17.4
Red oaks	79.3	83.6	93.9
Red pine	15.0	18.8	30.5
Soft maple	45.8	62.5	79.0
Spruce	7.8	9.4	10.8
White oaks	26.6	35.1	39.9
White pine	10.6	16.6	29.3
Yellow birch	8.4	9.7	10.6
Other species	39.9	51.3	69.7
<b>Total</b>	<b>467</b>	<b>536</b>	<b>626</b>

Wisconsin has about 626 million short tons of aboveground [biomass](#) in its forests (Chart 10). This is the equivalent of approx. 313 million tons of carbon. The amount of carbon and biomass has increased 17% since 1996 and 34% since 1983.

The species with the highest biomass to volume ratio are the hardwoods, especially the oaks, hard maple, and yellow birch (Table 6). The species with the lowest ratio are conifers such as balsam fir, the pines, and spruce and soft hardwoods like basswood.

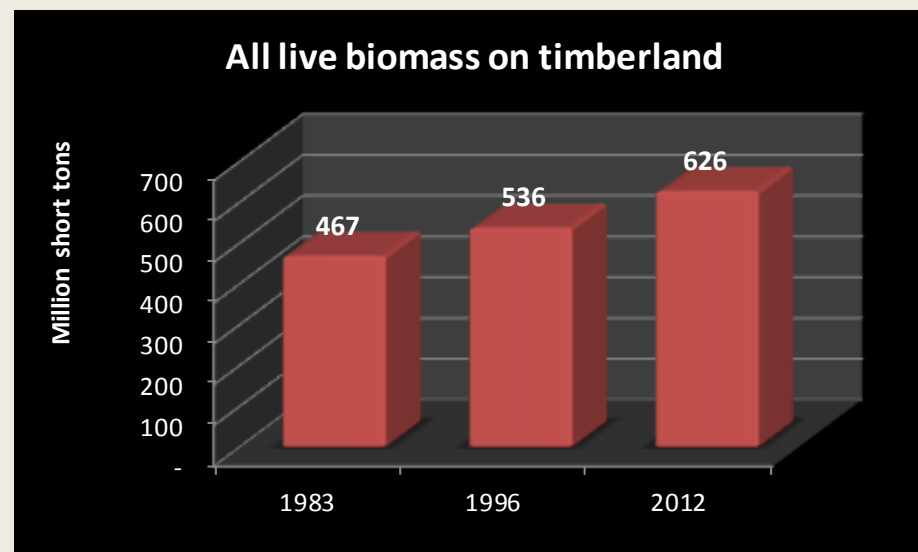


Chart 10. Aboveground biomass (million short tons) in live trees on forest land (USDA Forest Service, Forest Inventory & Analysis).